

Project Number: 5-WT616

# 277 Whenuku Road Gravel Quarry, Taranaki

## Assessment of Noise Effects on the Environment

18 September 2020

PUBLIC



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# 1 Introduction

WSP has been appointed by Horizon Trust Management Limited to provide acoustic consultancy services to assess the noise effects associated with an extension to the existing gravel quarry at 277 Whenuku Road, in Taranaki.

Whenuku Road Quarry was established in 2011 by Grant Cudby Contracting Limited and was taken over by Horizon Trust Management Limited in 2017.

The site currently produces and supplies aggregates for the local community of Hawera, mainly used as base course products in roading, pathways, drainage, cow races, and also for foundation works for infrastructure projects such as the new Hawera countdown building and carpark.

The proposal is to expand the extraction area to the north and northeast of the current quarry mine pit. There will be no change to the processing equipment on site.

The proposed expansion consists of an area of approximately 7.6 hectares with a total approximate gravel volume of 1.1 million cubic metres. The life of the quarry expansion is of limited duration, with the duration of consent propped for 25 years; however, extraction is expected to be complete within 15 – 20 years.

This assessment is based on our correspondence and documentation provided by the contractor and design team.

This report outlines relevant acoustic criteria for the quarry activities and assesses the potential effects of noise against the acoustic criteria.



## 2 Site Description

### 2.1 Location

The location of the current quarry and proposed extension to the quarry site in the context of the surrounding area is shown in Figure 2-1 below.

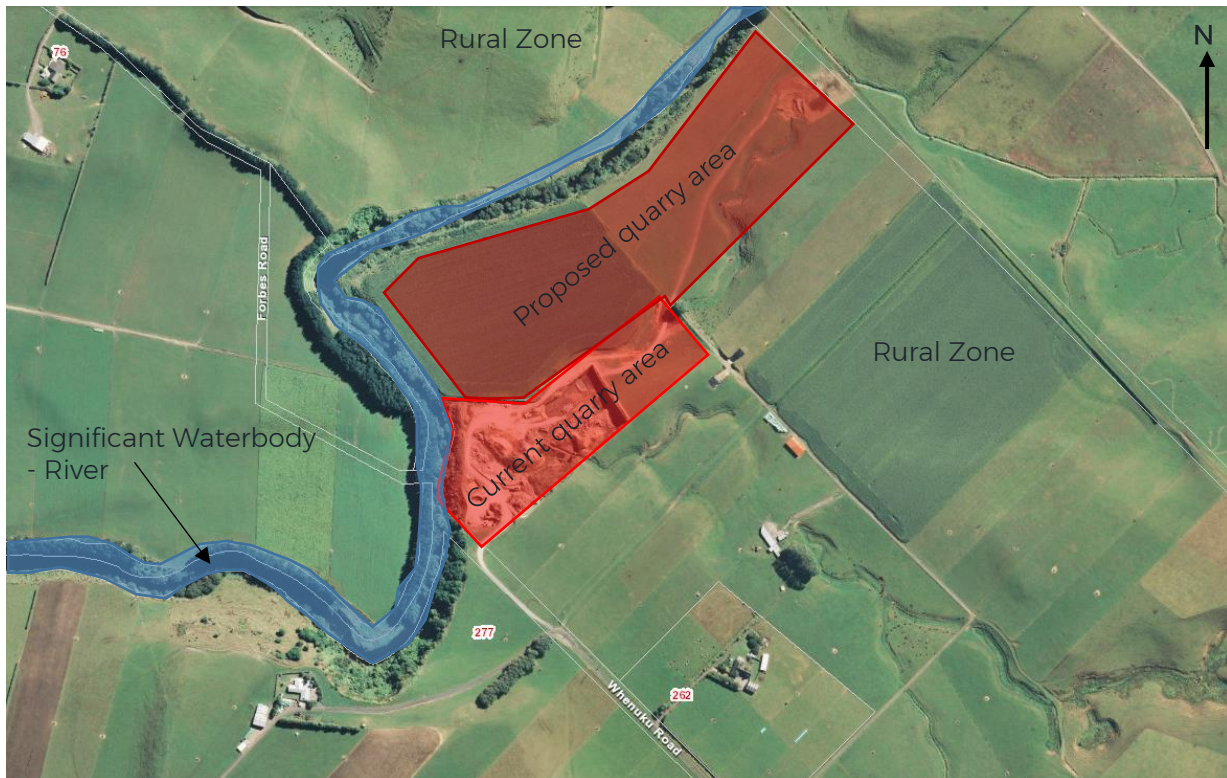


Figure 2-1: Location of the proposed quarry (South Taranaki District Council Local Maps accessed 17 August 2020)

The site is located in a Rural Zone with the Waingonogoro River located in a Significant Waterbody - River Zone, as outlined in the South Taranaki District Plan.

The quarry area is bounded by the Waingonogoro River to the west and north. The surrounding area is predominantly rural in character. In all directions surrounding the quarry, land is farmed and is typified as pasture having little other vegetation. The landscape characterised by rolling hills that fall towards the river.

### 2.2 Noise Sensitive Receptors

There are multiple dwellings along Whenuku Road, with the closest being 262 Whenuku Road, approximately 270 metres from the quarry site operations. Other nearby noise sensitive receptors which may be affected by noise generated by the quarry include:

- 262 Whenuku Road, Taranaki
- 76 Forbes Road, Taranaki
- 113 Katene Road, Taranaki
- 277 Whenuku Road, Taranaki

The above properties are shown in relation to the proposed quarry site in Figure 2-2 below.



*Figure 2-2: Location of nearby noise sensitive properties*

While the property at 277 Whenuku Road is owned by the landowner (not the Contractor), we have assessed noise at this property for completeness.

### 3 Acoustic Criteria

Section 16 of the Resource Management Act (RMA) requires occupiers of land to ensure any noise generated is of a reasonable level. Guidance as to a reasonable level of noise received at adjacent noise sensitive receivers is provided in a number of national and international sources, as outlined in Section 3.1 below.

Based on these guidance documents, if the noise level listed below is achieved between the hours of 0700 and 1900 hours (excluding Public Holidays) this would provide a reasonable level of noise:

- Notional boundary of any residential dwelling 55 dB  $L_{Aeq}(15 \text{ min})$

The noise levels shall be assessed, predicted and/or measured at the notional boundary of any dwelling, in line with assessment methodology outlined in NZS 6802:2008.

The notional boundary is defined as a line 20 metres from any side of a dwelling, or the legal boundary where this is closer to the dwelling.

Using the notional boundary provides an assessment location of the level of noise effect at the dwelling. As outlined below, it is understood the South Taranaki District Plan noise standards are measured at the site boundary. A secondary assessment has also been carried out in accordance with this requirement to allow for an assessment directly with the noise standards. However, this does not give an accurate representation of the effects from this activity.

#### 3.1 Acoustic Guidance and Legislation

##### 3.1.1 South Taranaki District Plan 2015

The noise limits for the Rural Zone are outlined in section 11.2.2 *Rural Zone and Township Zone*, in the South Taranaki District Plan, and are as follows:

##### 11.2.2 Rural Zone and Township Zone

1. Noise generated by any activity in the Rural Zone and Township Zones shall not exceed the following noise limits when measured at any point within the boundary of any other Rural Zoned or Township Zoned site:

7am to 7pm	55 dB $L_{Aeq}(15 \text{ min})$
7pm to 10pm	50 dB $L_{Aeq}(15 \text{ min})$
10pm to 7am	45 dB $L_{Aeq}(15 \text{ min})$
10pm to 7am	75 dBA $L_{Amax}$

The current noise rules in the South Taranaki District Plan 2015 are currently under Appeal (Appeal – D P Ellerton – ENV-2016-WLG-000074). However, it is understood the Appeal relates to exempt activities rather than the noise limits themselves.

Noise is to be measured in accordance with NZS 6801:2008 *Acoustics – Measurement of Environmental Sound* and assessed in accordance with NZS 6802:2008 *Acoustics – Environmental noise*.

##### 3.1.2 Operative South Taranaki District Plan 2004

The noise limits for the Rural Zone are outlined in Section 10.02.1 *Rural Zone* of the Operative South Taranaki District Plan 2004, and are as follows:



### 10.02.1 Rural Zone

- (i) *Noise generated by any activity (except those that are exempt under 10.01.4) in the Rural Zone shall not exceed the following limits when measured at or within the boundary of any other Rural Zoned site:*

7am to 10 pm	55 dBA $L_{10}$
10pm to 7am	45 dBA $L_{10}$
10pm to 7am	75 dBA $L_{max}$

As part of the Operative District Plan, noise is to be measured in accordance with NZS 6801:1991 *Measurement of Sound*, and assessed in accordance with NZS 6802:1991 *Assessment of Environmental Sound*.

NZS 6801 and NZS 6802 have been updated since the 1991 release, most recently in 2008, which is referenced in the South Taranaki District Plan 2015.

#### 3.1.3 New Zealand Standard 6802

The 2015 District Plan references NZS 6802:2008 for assessing noise emissions. New Zealand Standard NZS 6802 provides guidance daytime noise limit of 55 dB  $L_{Aeq(15 \text{ min})}$  which have been set “for the reasonable protection of health and amenity associated with use of land for residential purposes”, <sup>1</sup>. For rural dwellings, NZS 6802 assesses noise at the notional boundary, 20 metres from any dwelling.

The use of the notional boundary for the assessment of noise is generally the area where the majority of residential living activities occur and is a more practical approach for this assessment.

#### 3.1.4 World Health Organisation

The World Health Organisation (WHO) *Guidelines for Community Noise* (1995) document states that a 55 dB  $L_{Aeq}$  noise limit over a 16 hour daytime period will ensure that few people are seriously annoyed by an activity.

## 4 Quarry Activities

### 4.1 Site Layout

The proposed extension to the quarry is split into two defined areas – Area A and Area B (outlined in red in Figure 4-1 below), of which each are split into four different extraction zones. Each area will be quarried separately (with Area A first, and once complete, Area B). Extraction will occur generally from west to east.

The overburden in Extraction Area A will be partially used to fill a currently excavated area of the quarry with the remainder being stockpiled in bunds around the west and east of Area A between the proposed extraction area and River. Overburden in Area B will be stockpiled around the perimeter of Area B.

The machinery that is used in each extraction area will be the same. Storage of raw and processed gravel, site offices, and processing activities will also occur on site. The site layout, along with the extraction areas are shown in Figure 4.1 below.



Figure 4-1: Extension Area A and B (above), Equipment location (lower)



The lower diagram in figure 4.1 outlines the location of equipment on site. Information of the equipment in each location is outlined in Table 5-1 below.

The four zones which extraction occurs within in Area A and Area B are shown in Figure 4-2 below.



*Figure 4-2: Extraction zones in Area A (top) and Area B (below).*

Road trucks will access the site from the end of Whenuku Road to the south along the current entry to the site.

Once overburden is removed and stockpiled or used as fill on site, the proposed excavation areas will be excavated to 5 – 6 metres below ground level to the depth of the existing quarry, and a further 7 – 8 metres below the existing quarry ground level, which will be under the water table.

## 5 Assessment of Noise Effects

### 5.1 Equipment

The existing equipment on site that is to be retained is presented in Table 5-1.

Table 5-1: Current site activities and equipment information

LOCATION	EQUIPMENT	NUMBER	ZONE (OUTLINED IN FIGURE 4-1).	SOUND LEVEL (dB L <sub>WA</sub> )
Primary Crushing Plan	Goodwin Barsby Jaw Crusher – Electric	1	A	111*
Secondary Crushing Plant	Kumbee Hammer Mill – Electric	1	A	111*
Generator	CAT Olympian GEH275	1	A	96.9**
Wash Plant Processing	Masterscreen Discovery 1996	1	B	108*
Wash Plant Processing	Davies CN50-1000 7.5kW electric pump	1	B	96*
Wash Plant Processing	Electric Trommel	1	B	103*
Wash Plant Processing	Electric Sandwheel	1	B	103*
Extraction Area	30T Hydraulic Excavator	1	C	108*
Extraction Area	36T Hydraulic Excavator	1	D	108*
Processing Stockpile Area	19T Wheeled Loader	1	E	102*
Processing Stockpile areas/Loading	19T Wheeled Loader	1	F	102*
Pit Floor or at Extraction Point	Portafill CT5000 Screen	1	G	116*
Above Plant	Allied Petroleum Diesel Pump	1	H1	96*
By Wash Plant	Allied Petroleum Diesel Pump	1	H2	96*
By Plant	1.8T Excavator	1	I	95*
Between Face and Raw Stockpiles	20T Dump Truck	1	J	110***

\*Based on sound power levels given in BS5228-1:2008

\*\* Sound levels provided by manufacturer

\*\*\*Sound Exposure Level (SEL) for one movement of a vehicle

In addition to the above, the proposed plant in Table 5-2 is also likely to be used on site during various stages of works. The location of this equipment is not stationary.

*Table 5-2: Proposed activities and equipment information*

LOCATION	EQUIPMENT	NUMBER	SOUND LEVEL
Move with Extraction Area	Mobile Crushing Unit	1	116*
Move with Extraction Area	Dewatering pump	1	95*
Move with Overburden Removal	Bulldozer	1	108*

\*Based on sound power levels given in BS5228-1:2008

We have been advised that only five full time equivalent employees will be on site and working at a single time, along with up to two contractors when overburden removal occurs or for maintenance only. Therefore, all the plant listed in Table 5-1 and Table 5-2 will not simultaneously operate.

### 5.1.1 Assessment location

The assessment of noise from the operation of the quarry has been based on activities taking place at the nearest location that they may occur to any residential property surrounding the site. Residential dwellings that are located further away from those assessed are predicted to receive lower noise levels than those documented within this assessment.

## 5.2 Operation

The majority of the quarry activity will remain unchanged during the proposed new extension, with overburden removal and extraction now occurring in a different area of the site.

As outlined in Section 4, the proposed quarry works will be undertaken in two areas Area A and Area B. Activity within each of these zones can be split into two different phases, as described below.

- Overburden removal; and,
- Extraction.

Overburden removal will consist of removing the topsoil and other material and preparing the zone for extraction. The Contractor has indicated that it is likely that a bulldozer will be hired when needed to assist with the removal of overburden.

The quarry will operate between 0700 and 1900 hours Monday to Friday and 0800 to 1600 Saturday (excluding Public Holidays). Quarry works will therefore fall within the *daytime* period outlined in the South Taranaki District Plan. The hours of operation are not changing from that currently experienced on site.

Quarry activity generally falls within the peak season (mid-October to mid-December, February to mid-May), or the off-peak season (mid-December to January, and mid-May to mid-October).

During a typical week in the peak season, 2,500 tonnes of gravel would be trucked off-site, an average of 500 tonnes a day. During a peak hour of a peak day in the peak season, a maximum of 150 tonnes may be trucked off-site, in 3 truck and trailer units, and 7 truck-only units. Off-peak season sees considerably lower gravel removed from site.

Based on discussions with the contractor, in a worst-case scenario during excavation in the peak 15-minute period, on a peak day in the peak season, the main processing plant is operating with two loaders, one dump truck, and one excavator at the quarry face, with road truck arriving.



Overburden removal is likely to be undertaken in the off-peak season, when activity on the site is considerably lower. It is unlikely that road trucks would occur in the same volume; however, for the purposes of a robust assessment, we have assumed a similar level of operation including volume of road trucks in a worst-case scenario.

#### 5.2.1 Overburden removal

Overburden will be removed from each Zone in each Area prior to any extraction occurring. Based on discussions with the Contractor, the following machinery will operate during a peak 15-minute period, on a peak day, during the peak season:

- A single bulldozer and a single excavator working at ground level in the Zone in which extraction is to occur.
- A single wheeled loader moving between the overburden removal location and either the perimeter of the Area or to a previously quarried area on site for fill.
- Processing activities occurring in Areas A and B as indicated in Figure 4-1 above,
- Road trucks. Trucks will be loaded via a single wheeled loader around location E, and F in Figure 4-1 above. We have assumed a worst-case scenario where 2 truck and trailer, and 3 trucks would occur in a worst-case 15-minute period (total 10 movements).

#### 5.2.2 Extraction

Extraction is the typical operation of the quarry which will occur for the majority of the Consent timeframe. Based on discussions with the Contractor, the following machinery will operate during a peak 15-minute period, on a peak day, during the peak season:

- A single hydraulic excavator working at the quarry face and loading a dump truck.
- A dump truck hauling material between the excavation face and either processing area (F in Figure 4-1) or raw storage area (J in Figure 4-1).
- Processing activities occurring in Areas A and B in Figure 4-1 above.
- Road trucks. Trucks will be loaded via a single wheeled loader around location E, and F in Figure 4-1 above. A peak 1-hour period on a peak day would see 3 truck and trailer and 7 trucks will access the site. We have assumed a worst-case scenario where half of these (2 truck and trailer, and 3 trucks) would occur in a worst-case 15-minute period (total 10 movements).

Based on discussions with the Contractor, the peak scenario outlined above for both overburden removal and extraction will almost never occur, and for the majority of the operation, activity on site will be significantly less than this (resulting in lower noise emissions from the quarry site), even during the peak season.

Light vehicles (SUV's, Utes, sedans, etc.) will arrive on site prior to the commencement of the quarry works light vehicles have been assessed separately in Section 5.3.1.

### 5.3 Predicted Noise Levels

SoundPLAN Version 8.1 3D computational noise modelling software has been used to assess the transmission of noise from the proposed extension to the quarry to adjacent noise sensitive receptors, based on the methodology contained within ISO 9613-2. The assessment takes into account attenuation due to distance and terrain and absorption by the atmosphere and ground. Our assessment assumes worst-case downwind conditions in all directions from the source which provides a conservative approach for assessment. 1 metre ground elevation contours for the immediate quarry site have been provided based on a recent site survey undertaken, and 1:50,000

ground elevation contours have been sourced from Land Information New Zealand (LINZ), which provide contours at 20 metre vertical intervals for the wider area outside the quarry site.

We have undertaken noise modelling over a number of areas for overburden removal and extraction, with the worst-case predicted sound levels given below

Under NZS 6802:2008, where an activity produces a Special Audible Characteristic (SAC) a 5dB penalty shall be applied. For a quarry site, possible SAC include noise from reversing beepers or track squeal from excavators during dry conditions. We have assumed that these would be addressed through managerial mitigation (such as regular maintenance or using broadband reversing beepers) and therefore the 5 dB penalty would not need to be applied to this site.

For activities on site that occur for a limited duration, or that occur during the daytime period, but at a reduced rate to the peak period assessed, a 5 dB duration adjustment can be applied under NZS 6802:2008. We have allowed a 5 dB duration adjustment for road trucks only, as during other periods, road trucks will operate at a significantly lower capacity than that predicted.

Based on the level of activity outlined in Section 5.2, the predicted noise levels at the notional boundary of all adjacent residential properties are given in Table 5-3 and Table 5-4 below:

*Table 5-3: Predicted noise levels from overburden removal*

Property	Noise criteria at notional boundary (L <sub>Aeq</sub> (15 min))	Predicted noise level at notional boundary (L <sub>Aeq</sub> (15 min))	Meet Criteria?
76 Forbes Road	55 dB	47	Yes
262 Whenuku Road	55 dB	45	Yes
277 Whenuku Road	55 dB	52	Yes
113 Katene Road	55 dB	38	Yes

Noise from Overburden removal are predicted to be below the 55 dB L<sub>Aeq</sub> noise criteria when assessed at the notional boundary of any residential dwellings in adjacent sites.

*Table 5-4: Predicted noise levels from extraction activities*

Property	Noise criteria at notional boundary (L <sub>Aeq</sub> (15 min))	Predicted noise level at notional boundary (L <sub>Aeq</sub> (15 min))	Meet Criteria?
76 Forbes Road	55 dB	46	Yes
262 Whenuku Road	55 dB	48	Yes
277 Whenuku Road	55 dB	52	Yes
113 Katene Road	55 dB	37	Yes

Noise from a worst-case extraction activity are predicted to be below the 55 dB L<sub>Aeq</sub> noise criteria when assessed at the notional boundary of any residential dwellings in adjacent sites.

The noise limits outlined in the South Taranaki District Plan are also predicted to be achieved, with the following exceptions:

- 76 Forbes Road. The site boundary of 76 Forbes Road is located directly across the Waingongoro River.
- 113 Katene Road. 277 Whenuku Road and 113 Katene Road share a site boundary. When overburden removal occurs, machinery are located at ground level, with no screening to the site boundary.

The areas of exceedance of the District Plan noise limits are shown in red Figure 5-1 below.



Figure 5-1: Location of site boundary exceedance

The worst-case noise levels at both 76 Forbes Road and 113 Katene Road site boundaries are predicted to be 64 dB  $L_{Aeq}(15 \text{ min})$ . However, the exceedances are a significant distance away from the dwellings on site.

In both cases, the exceedances are predicted to be over areas of the adjacent site that are not currently used for residential purposes. We therefore expect that these exceedances will have a negligible noise effect.

A general noise contour map showing the noise emissions for overburden removal and extraction are presented in Appendix A and B.

### 5.3.1 Noise from light vehicles entering and exiting the site

Light vehicles will enter and exit the site from time-to-time as staff arrive and depart and for visitors coming to site. The majority of light vehicle movements will occur at the start or end of the day as staff arrive and/or depart.

Based on the maximum number of staff and contractors that will be on site, up to 7 light vehicles have been assumed to enter or exit the site in a worst-case 15 minute period (as all staff arrive or depart at once). Vehicles will arrive and depart the site via Whenuku Road, and park near the site offices shown in Figure 4-1 above. We have undertaken calculations of light vehicles moving through the site based on a sound level of a vehicle drive-by having an SEL of 70 dB  $L_{AE}$  at 10 metres.

The noise levels at the notional boundary of the nearest adjacent residential properties are predicted to be less than 30 dB  $L_{Aeq(15\text{ min})}$ , which achieves the 55 dB  $L_{Aeq}$  noise criteria at the notional boundary of the adjacent sites.

We note that the 55 dB  $L_{Aeq(15\text{ min})}$  District Plan daytime noise limit will also be achieved when assessed at the property boundary.

## 6 Conclusions

WSP has undertaken an assessment of the noise associated with the operation of an extension to the current gravel quarry at 277 Whenuku Road, in South Taranaki. The quarry is to provide gravel to be used as base course products in roading, pathways, drainage, cow races, and also for foundation works for infrastructure projects .

The quarry will operate between 0700 and 1900 Monday to Friday and 0800 to 1600 Saturday. No site works will occur on Sundays or Public Holidays. These are not changing from that currently experienced on site

We have undertaken a general assessment of overburden removal and extraction within the proposed two extension areas of the Quarry. We have assumed a worst-case overburden and extraction scenario that would occur during a peak 15-minute period, on a peak day, during peak season. Generally, overburden removal will occur in the off-season, and extraction will occur at a reduced activity level on site to that assessed, and therefore noise emissions are expected to be lower than predicted in reality.

Noise generated by quarrying activities during the operating hours are predicted to achieve the 55 dB  $L_{Aeq(15 \text{ min})}$  noise criteria when assessed at the notional boundary of all adjacent residential dwellings. Therefore, the noise generated by the proposed quarry are predicted to be at a reasonable level.

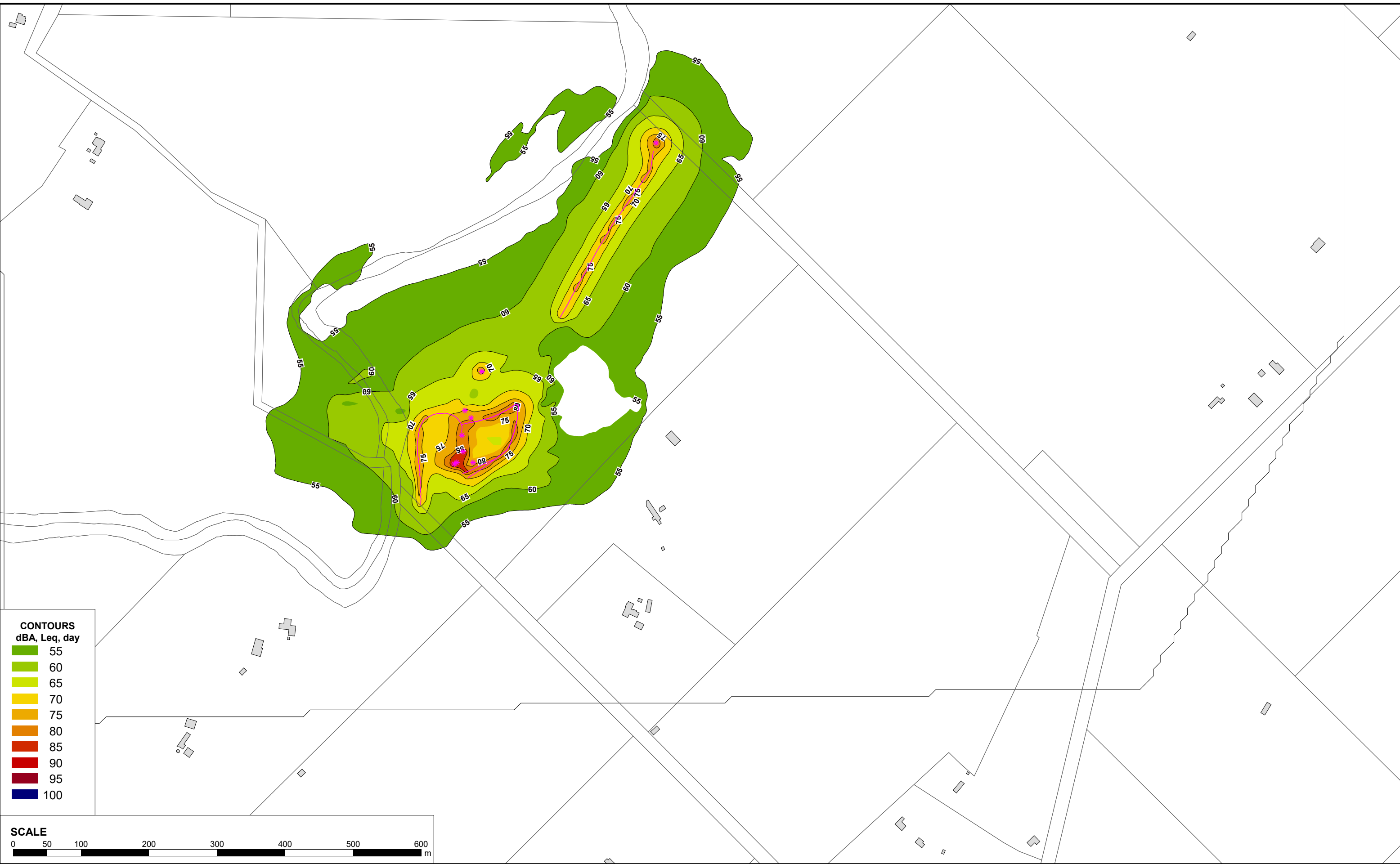
Noise levels are also predicted to be below the South Taranaki District Plan site boundary noise limits apart from at 76 Forbes Road, and 113 Katene River. However, the elevated noise areas do not occur over an area used for residential activity, affecting only pastoral farmland.

Therefore, on the basis of the assessments presented within this report, noise as a result of the proposed extension to the quarry site is not considered to be a material constraint to the reasonable operation of the facility.



# Appendix A

## General Overburden noise contours



Date: 28/08/2020	Prediction Algorithm: ISO9613-2:1996
Appendix: A	Prediction Height: 1.5 m
Map Number: 1	Coordinate System: UTM Zone 55 WGS84
Client: Horizon Trust	Author: GvH

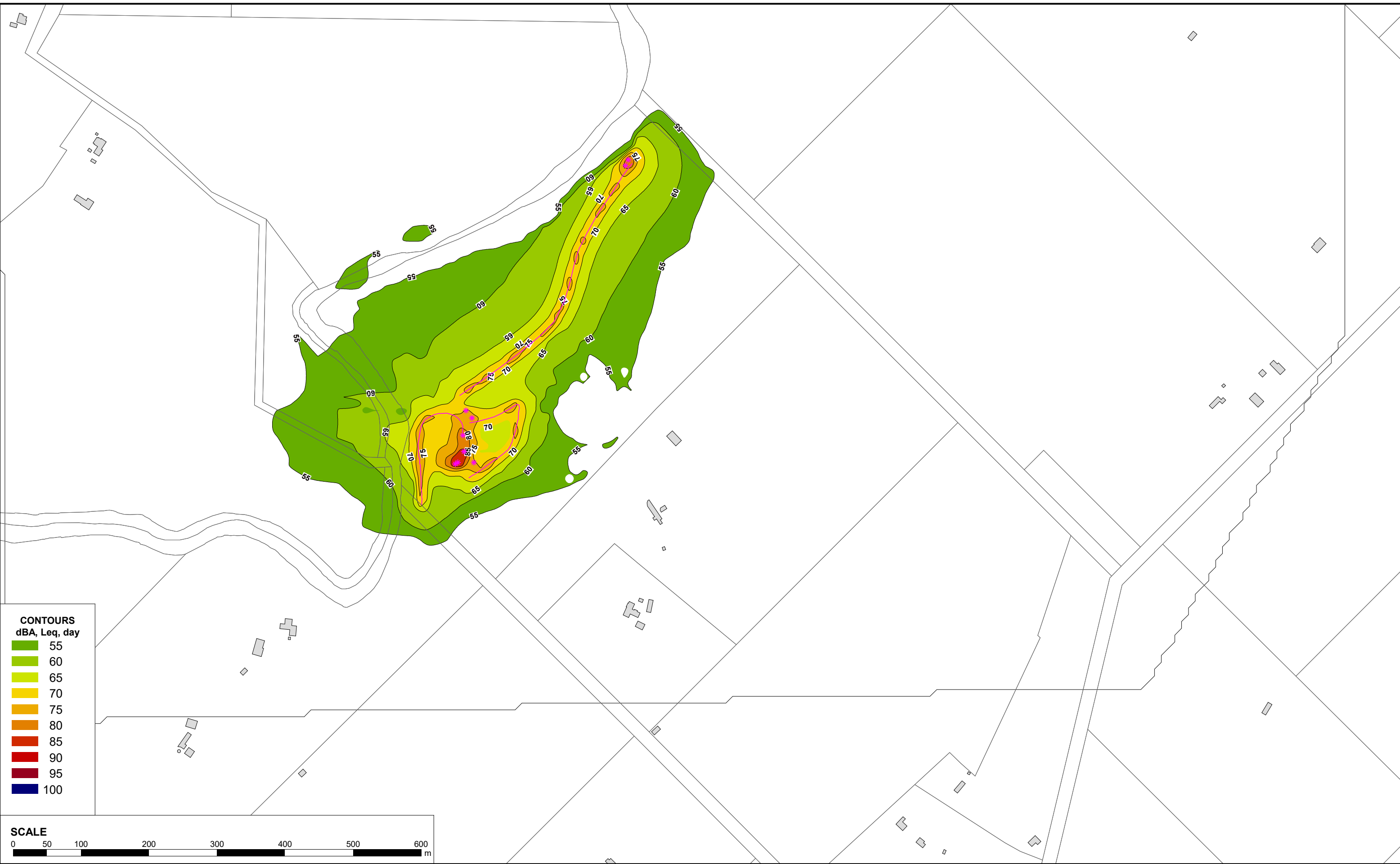
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**277 Whenuku Road Quarry, Taranaki**  
**General Overburden Removal Noise Contours**


# Appendix B

General extraction noise contour



Date: 28/08/2020	Prediction Algorithm: ISO9613-2:1996
Appendix: B	Prediction Height: 1.5 m
Map Number: 1	Coordinate System: UTM Zone 55 WGS84
Client: Horizon Trust	Author: GvH





**277 Whenuku Road Quarry, Taranaki**  
**General Extraction Scenario Noise Contours**

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